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By Frederick S. Blackall, Jr.

President, Special Tool, Die and Machine Shop Institute

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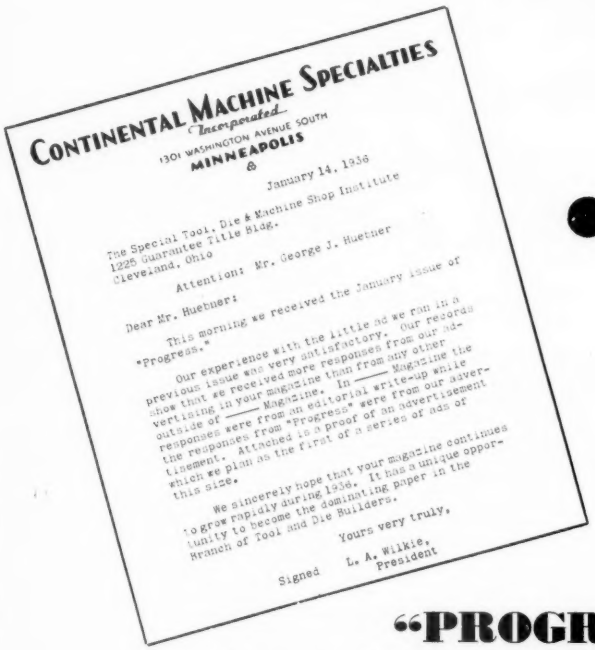

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January 14, 1936

The Special Tool, Die & Machine Shop Institute
1225 Guardiuter Title Bldg.
Cleveland, Ohio

Attention: Mr. George J. Huebner

Dear Mr. Huebner:

This morning we received the January issue of "Progress."

Our experience with the little ad we ran in a previous issue was very satisfactory. Our records show that we received more responses from our advertising in your magazine than from any other outside of _____ Magazine. In _____ Magazine the responses were from an editorial write-up while the responses from "Progress" were from our advertisement. Attached is a proof of an advertisement which we plan as the first of a series of ads of this size.

We sincerely hope that your magazine continues to grow rapidly during 1936. It has a unique opportunity to become the dominating paper in the branch of Tool and Die Builders.

Yours very truly,

Signed L. A. Wilkie,
President

"PROGRESS"

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Your sales message cannot be as effectively placed before T.D.M. Members in any other form for so little.

For detailed information please address:

GEORGE J. HUEBNER, Secretary
Special Tool, Die and Machine Shop Institute
P. O. Box 3561
CLEVELAND, O.

A Toolmaker Delves Into History

First jigs and fixtures built by Eli Whitney in 1798.

YOU have asked me at different times to write something for PROGRESS. Like many another member of our Industry, as a writer I am a better toolmaker. I have had to snatch the literary part of my education on the fly. But today, while at our public library I ran across some articles which were very interesting to me because they made me realize that I am a member of an old and honorable profession.

If you, Mr. Editor, think that the quotations are worth reprinting and that other shop-owners will find them interesting, go ahead and print them but *don't use my name.*

First, I ran across this unique description of Man:

> "Man is a Tool-using Animal. Weak in himself, and of small stature he stands on a basis, at most for the flattest-soled, of some half square foot, insecurely enough; has to straddle out his legs lest the very wind supplant him. Feeblest of bipeds! Three quintals are a crushing load for him; the steer of the meadow tosses him aloft, like a waste rag. Nevertheless he can use Tools, can devise Tools; with these the granite mountain melts into light dust before him; seas are his smooth highway, winds and fire his unwearying steeds. Nowhere do you find him without Tools; without Tools he is nothing, with Tools he is all."
>
> Thomas Carlyle.

This was part of an article with the title of "Sartor Resartus." There never having been much Latin spoken around the shops I worked in, I had to ask one of the library attendants to translate it. It means "The Tailor Retailored," and was in an article published in 1833—a mere 100 years ago.

Next I ran across a book with the imposing title of "*American Tool Making and Interchangeable Manufacturing.*"

As my modern daughter would say: "I was intrigued."

The author of the book was Joseph V. Woodworth—perhaps a relative of our Trustee—and was published 25 years ago. Here are parts of Chapter I:

ELI WHITNEY

"The inception of the modern system of interchangeable manufacturing—according to the best authorities—was in 1798; and the honor of being the first "interchangeable manufacturer" belonged to Eli Whitney, the inventor of the cotton-gin, who, in January of that year, secured an order to furnish the United States Government with ten thousand muskets, four thousand to be delivered in one year and the balance in two years. We read that "Mr. Whitney went at the undertaking in a very thorough and systematic way. First, he developed a water-power, erected suitable and adequate buildings, considered ways and means for a larger and better product, designed machinery to effect it, and trained workmen to skill in the new employment. However, the difficulties which he encountered were greater than he had supposed, and it was eight years instead of two before the order of ten thousand arms was completed. . . . His shops at New Haven, Conn., became the mecca of government officials, manufacturers, travelling notables, and foreigners, and that which he could show was well worth a journey, for his innovations in the manufacture of arms were as epochal as his invention of the cotton-gin." *It was in the manufacture of those muskets that Whitney first conceived and put into successful operation "jigs" and "fixtures" for the duplicate production of parts to a limited degree of variation which would permit of their interchanging.* Thus the modern manufacture

(Continued on page 13)

Our Own Washington Letter

Facts Gleaned From Authoritative Sources

N. A. M. BULLETIN: "*Altogether, bills embracing at least 15 broad Industrial subjects are in the legislative mill.* In the last 10 days, substantial progress has been made in each category. . . .

The status of the astoundingly comprehensive industrial legislation: Revision of the Walsh bill, . . . was completed for the sub-committee's further consideration. . . . The new substitute for the bill passed by the Senate was equally as broad and precedent-making as the original measure in its application of restrictions to those who make contracts with the federal government.

The Senate Interstate Commerce committee set down for hearings beginning March 3, the Wheeler-Rayburn bill, designed to expand Federal Trade Commission powers 'over unfair and deceptive acts and practices' as well as 'unfair methods of competition.' . . .

The Van Nuys bill, to prohibit employers from attempting to influence the votes of their employees in national elections, already passed by the Senate, was referred to a House Judiciary subcommittee. With it went the Perkins bill, to extend the prohibition to officers or agents of the federal government. . . .

A new anti-lobbying bill "would require all *organizations* and *individuals* which *oppose or favor enactment or repeal of any legislation or law:* which *try to 'influence directly or indirectly the passage or defeat of any legislation or appropriation'* by Congress; or which seek to *'nominate, elect, or defeat any candidate for' the House or Senate,* to file with the clerk of the House each *month a detailed* statement of *all expenditures and receipts exceeding* $10. *Violators* of the measure could be fined $1,000 and imprisoned one year, and the act would apply even to "owners, proprietors or publishers of any publication published and circulated for the principal purpose of accomplishing any of the foregoing objects.

KIPLINGER LETTER: NRA talk is to be discontinued until after the election. However, new interest in studying the old NRA, its operation and results is apparent and "it is assumed by both politicians and economic authorities that some form of *government regulation of private industry* will be active issue again next year, regardless of who wins elections."

Kiplinger reports the President as being sure of reelection because the "masses," the "underdogs," and labor are for him. Also "business 'chiselers (his word)' are making votes for him by longer hours, lower wages, ex NRA. He feels deeply about it. He thinks government must impose on industry standards of *MAXIMUM HOURS, MINIMUM WAGES.* He does not believe in compulsory 30-hour legislation, but warns business that it may come if business can't control its own 'chiselers.'"

CHESTER WRIGHT'S LABOR LETTER: What labor leaders think and say should be of interest to every shop-owner and executive.

Labor is concerned about the extent to which federal, state and city educational facilities are being made available to industries "to train young workers to replace—at low wages—older more skilled and *organized* workers. . . .

Now the automobile industry is reported to be turning the public schools of *Detroit, Cleveland, Toledo* and other cities into training camps to replace organized skilled workers. . . .

Apparently industrial management has convinced local school authorities that special training courses should be included in school programs so that the girls and boys might be able to step right into a factory and get *paid* jobs. Labor argues that the cost of training new workers should be paid by the employer.

Council for Industrial Progress (Major Berry's), may recommend *minimum wage* and *maximum hour law.* It claims to have "data showing that 20,000 corporations have departed from the standards set up under the NRA for wages and hours and that wages of 1,500,000 employees have been reduced."

"Better Machine Tools for the Toolmaker"*

By Frederick S. Blackall, Jr.

President, Special Tool, Die & Machine Shop Institute

"Let it not be forgotten that the toolmaker is essentially a craftsman —something of a sculptor in metal—producing articles which in most instances have not been and will not be duplicated. Working by hand, then, he requires tools which will essentially extend his reach and magnify his touch, accentuating rather than diminishing his manual dexterity."

ONE of the more heartening features of the recent Machine Tool Show in Cleveland—at least to those who are charged with responsibility for the production of tools, dies, jigs, fixtures and other tool room products—was the evidence which was apparent on every side that machine tool manufacturers are at last awakening to the fact that mass production is not the sole function of machine tools in our modern economy. A capacity for taking phenomenally heavy cuts, the super-imposing of multiple spindle upon multiple spindle, and all of the other concomitants of latter day mass-production design are all very well in their place but when machine tool designers direct all of their energies toward evolving tools of this nature, the toolmaker and his foreman become very much the forgotten men of the metal cutting industry.

It is perhaps natural that the ever-increasing production of the boom years, culminating in the excesses of 1929, and the accompanying pressure for lower cost, should have evidenced themselves in the Machine Tool Show of that year with an almost exclusive devotion to the cause of mass-production. Indeed, it was a startling fact that in 1929 many concerns which had built their reputations upon the manufacture of fine tools for the solution of precision problems seemed to discard altogether in that year models of machines which had been standard in the tool rooms of the country for many years and, offering no substitute for them, gloried in new products which would be as out of place in a tool room as a steam roller would be on the front lawn.

Toolmaker Still a Manual Worker

This trend was notably evident in milling machine design. Designers attuned to the new needs of the production industries evolved models of such rugged construction that in the eyes of the toolmaker they could only be characterized as cumbersome. Automatic features of every sort were provided, power traverse was limited only by the natural bounds of a three-dimensional world, until it seemed that machine tool builders had entirely lost sight of the fact that the toolmaker is still a manual worker whose machine, of necessity, must become a part of him—in which he can sense a certain element of human "feel."

Lathe design, perhaps to a lesser extent, followed the same trend. Each lathe maker's booth was shrouded in a cloud of smoke if indeed his machine itself was not buried in a mountain of blue chips, mute testimony to the ability of his machine to reduce an 8-in. bar to a sewing machine spindle in a trice with the aid of the newly developed tungsten carbide cutting tools.

Drill press design curiously lagged behind the parade but where any new development was evident, it seemed to take the same course with "hole-hogs" and special purpose production spindles the order of the day. The much needed development of light high-speed, quick change-gear drills was left to the next half decade.

Boring machines offered little of new interest to the toolmaker in the 1929 Show and only in the field of light jig boring was there evidence of serious consideration of his problem.

(Continued on page 11)

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"Ten Facts on Technology and Employment"

A Study by the Machinery and Allied Products Institute

[EDITOR'S NOTE: *Although this pamphlet was released last month, it is such a valuable contribution to the argument that machines make jobs, that we feel justified in reprinting portions of it in order that all TDM Industry members may be sure of the facts.*]

I—Jobs Increase Faster than Population

Between 1870 and 1930 the population of the United States increased 218 per cent, while the gainfully employed increased 291 per cent. Shortly after the Civil War, before the great strides in technological advancement had been made, 324 persons were employed in producing the goods and services for each 1,000 inhabitants. By 1930 a higher standard of living, resulting largely from development of machinery, had created so many new desires that 400 persons were at work filling the demands of each 1,000.

There was a gain of 20,000,000 new jobs during the period of most intensive technological advancement, 1900 to 1930. For each 1,000 of the 47 million added population 422 new jobs were created in this period of twentieth century development.

II—Employment is Nearest Normal in Most Highly Mechanized Industries

If unemployment were due to machines displacing men it should be most severe in the industries where machines are used most. However, it is nearest normal levels in the most highly mechanized industries, such as automobile and textile manufacturing, in the paper and printing trades and other intensely developed manufacturing industries. Most of today's unemployment is in occupations in which machines are used least. It is severest in building construction, the service trades, foundry and machine shops and heavy machinery manufacturing where most of the work is done by skilled men.

III—Eighteen New Industries, Resulting from Machinery Development, Have Created Millions of New Jobs

One of each seven factory workers today has a job making some product that was unknown to his grandfather fifty years ago. Eighteen of the major manufacturing industries of today have been wholly developed since 1880, and they would not be in existence except for technological advancement which has taken place since that time. They are responsible for the employment of 1,000,000 workers in manufacturing alone. It is impossible to determine accurately the additional millions who receive employment producing and processing raw materials for these industries, and handling, servicing and selling the finished products, but it may be conservatively estimated that one out of every four persons gainfully employed today owes his job to one of these eighteen new industries.

IV—Growing Occupations Add Three New Workers While Vanishing Occupations Lose One

Between 1920 and 1930 the nineteen principal growing occupations gained three times as many workers as the nineteen principal vanishing occupations lost. In 1930 there were 321,322 fewer draymen, teamsters and stable hands than in 1920; 134,000 fewer millwrights and diesetters; 75,000 fewer dressmakers in homes; and 74,000 fewer blacksmiths. The total loss in the nineteen declining occupations was about 800,000, as contrasted with a gain of more than two and a quarter million in the nineteen growing occupations. The gain consisted partly of an increase of 687,000 truck drivers and chauffeurs; 356,512 mechanics; 428,945 building and general laborers; 205,899 painters and glaziers; and 158,000 hair-dressers, manicurists and barbers. A significant fact in connection with this change in occupations brought about by technological advancement is that less arduous, more pleasant and better compensated jobs displaced old, strenuous, hazardous occupations.

(Continued on page 12)

S. N. Sloan Suggests a "Nickname"

FOR a long time we have realized the unwieldiness of our name. True, it is all-inclusive but it is hard to handle.

It was very gratifying, therefore, when we opened the mail one morning and found the following in a letter from S. N. Sloan who is secretary-treasurer of the Mayle Manufacturing Company of Toledo, Ohio, a member of our Industry. He wrote:

> "Although not alphabetically inclined, I believe the name of the Institute should be shortened or at least given a nickname that could be easily popularized. For example, it might be known as the T.D.M. Institute (prounced Tee Dem). Also, an official emblem or mark adopted for use on members stationary so that the trade in general could be made 'institute conscious'."

T.D.M. looks good and sounds good, doesn't it?

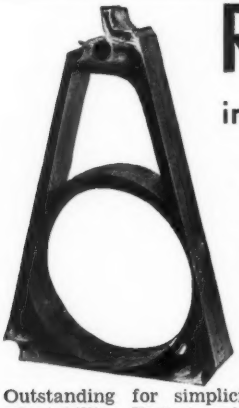
Should it be pronounced Tee Dem or Tee Dee Emm? The letters T.D.M. cover our line pretty well—Tools, Dies, Machines — and the suggestion has been made that all three letters should be pronounced thus:

Tee Dee Emm Industry—T.D.M. Institute.

What do you think about it, Mr. Industry Member who are reading this?

Mr. Sloan's suggestion of an official emblem should be adopted. He sketched his idea—T.D.M. with the words Member above and Institute below and all of them set into the angle of a tool maker's square.

Let's discuss this "nickname." Please write us what you think about it and give the Industry the benefit of your suggestions.



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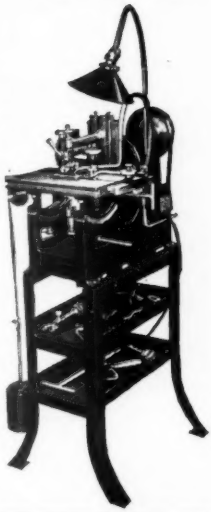
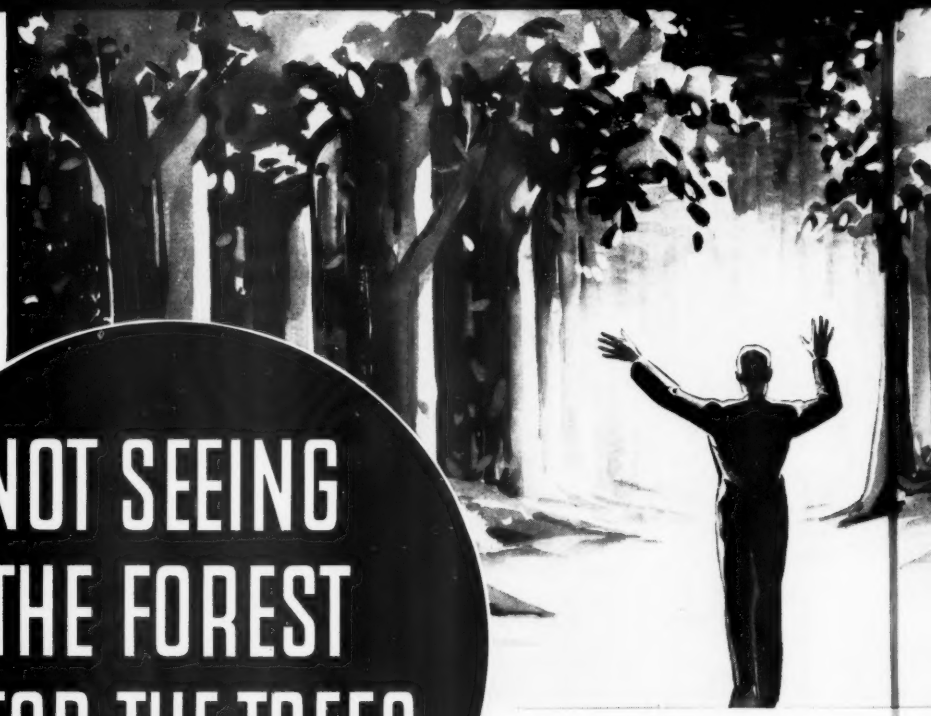
The FOLEY Die-Making Machine does accurate metal cutting and die filing in record time. Here is actual time on this piece of Crescent Tool Steel (1¼" thick): outside cut, 20 inches, 3.30 hours, — irregular inside cut, 10¾", 1.10 hours, — circle cut, 4¼" diameter, 1.50 hours.



FOLEY
Die-Making Machine

Outstanding for simplicity, precision, accuracy, speed and adaptability. Fastest reciprocating metal cutting saw for tool steel. Saws to any corner at two angles. Practically no time lost in changing set-up from sawing to filing. Cuts hardest tool steel up to 3" thick, and saws to center of 13" piece. Takes any saw, uses standard files. Adjustable positive feed saw guide, four speeds, adjustable table and ram. ¼ h.p. motor, handles heaviest work. *Write for illustrated descriptive circular and price.*

Foley Mfg. Co., 50 Main St, N. E., Minneapolis, Minn.



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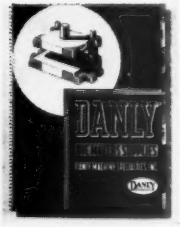

● From Danly's unlimited number of possible combinations of die set size, thickness and material of shoe and punch holder, bushings and length of pin—you select the die set ideally suited to the job in hand—*faster*—because the new Danly Catalog is easier to use and more complete than any other listing of its type.

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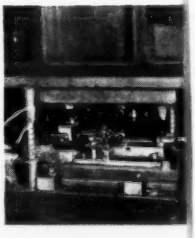

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● Danly Die Sets are more accurate — give more accurate parts — and give greater production per die before regrinding.

A typical example of Danly's long-lived accuracy is furnished by this progressive die blanking and piercing holes in oil well chain sidebars. Accuracy of pitch is a prime requirement in sprocket chain. Danly Die Sets produce that accuracy unfailingly.

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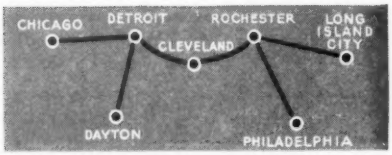

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DIE MAKERS' SUPPLIES

PROGRESS

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EDITED BY

George J. Huebner, *Secretary*

Vol. II, No. 1 March, 1936

Does the Average Tool and Die Contract Shop Receive an Adequate Profit?

[*This editorial frankly discusses the question from the standpoint that it does not. Certain remedies are set forth. Other executives may not agree with these. They are invited to write us their opinions.—Ed.*]

THE most frequent complaint received from Institute Members has to do with the low standard of prices obtained for the products and services of the Industry.

These complaints come from every part of the country. They vary only in degrees of seriousness. Thus one industrial district reports that the year 1935 was the most unprofitable of all the years of the depression, while shop-owners and executives in other districts with whom we have discussed current conditions, say that contracts for new work are being taken at prices which in some instances do not cover actual cost of materials and labor, much less allow a profit.

The President of a representative shop writes us that recently in competition a job was taken by the low bidder at less than $10,000, whereas the price should have been at least $16,000. Such discrepancies are extremely difficult to account for and frequently can be, only on the basis of "getting away with" a decidedly inferior standard of workmanship, or as in a case recently brought to the writer's attention, the attempt to operate a shop on the "contract labor" basis.

Both of these methods constitute "unfair competition" and bring discredit upon the Industry.

Again the President of a member shop writes:

> "If we could get the jobbers to cooperate and talk over the problems that confront us, it would be worth something, but it is impossible to do this."

BUT THIS SHOULD NOT BE IMPOSSIBLE.

In all parts of the country, every day of the week business men meet to find ways and means of accomplishing cooperatively what they find difficult to do individually.

In Cleveland, members of the local group get together one day each week for lunch. In Detroit there are monthly member's meetings and intervening director's meetings. The same is true of Dayton and New York.

It would seem that general price discussion in our Industry could not be in violation of any laws of the land. Because practically all specially designed tools, dies and machine equipment are handled on an "estimate and contract" basis, there are bound to be differences of opinion as to the hours required, but in the final analysis the hourly rate used should not be much different for one shop than for another.

This hourly rate and the many factors which enter into its determination are proper subjects for discussion. Wages paid to skilled shop workers are in direct ratio to the hourly rates obtainable from customers. The entire contract shop organization is dependent upon this rate — the shop itself for a legitimate operating profit and the worker for a living wage. It is an injustice to every competing shop as well as to labor, when a shop owner in any district deliberately quotes prices which do not assure *both*.

And when these "insufficient" prices are quoted, there is no assurance that the customer will benefit. It is a temptation for a shop which has a loss staring it in the face, to cut the corners. Result: A poor product is probably turned out, the customer is dissatisfied and the Industry gets a black mark.

"We need more money" for our products. The first step toward achieving this is for members of the Industry to get together in their respective districts, frankly talk over the problems which confront them and find ways and means to overcome them.

Other industries have done it. We can too.

Better Machine Tools

(Continued from page 5)

Accessory equipment and machine tool specialties such as die sinkers, die filing machines and similar tools presented an occasional novelty in their field but for the most part evidenced little thought to the problems of the tool room.

Before we contemplate the change which the ensuing six years have wrought, let us consider for a moment wherein the requirements of the toolmaker differ from those of his brother in the production department and why it is all important—important, indeed, even for the ultimate needs of mass-production itself—to provide the toolmaker with implements of sufficient precision and delicacy to permit him to work out his problems to the best of his ability.

Machines Should Assist, Not Hinder Manual Dexterity

Let it not be forgotten that the toolmaker is essentially a craftsman—something of a sculptor in metal—producing articles which in most instances have not been and will not be duplicated. Working by hand, then, he requires tools which will essentially extend his reach and magnify his touch, accentuating rather than diminishing his manual dexterity. Thus it follows that machine tables must be of such weight and construction that they can be moved with a minimum of effort and a maximum of precision. Rigidity is important for the attainment of precision, but its advantages are defeated if it is accomplished by so much addition of weight that the machine must be "horsed" into the proper position or if mere inertia of cumbersome weight destroys delicacy of adjustment. Physical fatigue can quickly destroy the fine touch of the toolmaker.

Simplicity of set-up is a *sine qua non* of tool room equipment. The toolmaker may have to go into a machine twenty times a day on twenty different operations, each consuming but a few moments in itself. The old time tool room

(Continued on page 14)

"Ten Facts on Technology and Employment"

(Continued from page 6)

The trend toward more pleasant work and better working conditions has paralleled the development of machinery. An outstanding example of this is the decline in child labor from one out of every five children between 10 and 15 years of age working in 1900 to less than one in twenty in 1930.

V—Less Than 4% of 2½ Million Blame Machines for Loss of Jobs

Only 4 per cent of about 2,500,000 unemployed studied in the Federal Unemployment census of April, 1930, reported that they lost their jobs on account of "industrial policy," under which the displacement of men by machines was listed as one of several sub-classifications.

VI—Eighty-four Per Cent of All Machines Invented are "Labor Serving" Rather than "Labor Saving"

Only 16 per cent of all inventions have as their primary purpose the saving of labor, according to a study of recent patents. Most machines are invented to create entirely new products, to render new services or to improve old products or services. Seven-tenths of all inventions tend to increase labor's relative share of the national income.

VII—Workers Are in Greatest Demand Where Most Machines Are Installed

After a detailed study of the effect of technology on employment, the National Industrial Conference Board concluded that "industries which advanced most rapidly along technological lines drew most heavily on the labor supply, while industries which were mechanized more slowly absorbed smaller portions of the available working force. This is due to the fact that machines decrease costs and prices, improve the quality of goods, and stimulate sales. Employment is thus increased throughout the innumerable fields of the industrial system."

VIII—Machinery Has Raised Labor's Earning Power

Real wages—the purchasing power of labor in terms of goods—more than doubled between 1900 and 1935. Higher wages have been made possible by greater production. In the first thirty years of this century production per wage earner increased 68 per cent, but to make this increase possible manufacturers installed 331 per cent more equipment, measured in horsepower. An important factor in increasing the value of all incomes in terms of goods was the reduction of prices made possible by technological advancement.

Wage and salary earners received 67.4 per cent of the national income of 1934 (the latest year for which figures are readily available)—a larger share than ever before in history. While production of American factories increased 216 per cent between 1899 and 1929, wages paid to labor increased 479 per cent.

IX—Higher Standard of Living Attainable Only Through Increased Production by the Use of Machinery

Production on the scale and of the quality essential to provide the present American standard of living would be impossible without the machinery used today. Much of the work that must be done in industry is of such a nature that it would be physically impossible for human hands to do it. Moreover, if technological advancement did not make possible a greater volume of production the standard of living could be raised only by increasing hand labor. Had it been necessary to increase hand labor in the same proportion as production between 1900 and 1930, every adult man and woman in the nation and several million children would have been needed in jobs. It would have required more than 60 per cent of the entire population whereas only about 40 per cent ever seeks gainful employment, the remaining 60 per cent being constituted chiefly of women and children supported by the 40 per cent. The absolute limit of improved living standards would be quickly reached if industry instituted no technological advancements. With the increased use of machinery there need be no limit to the abundance of goods and services enjoyed.

X—Need to Raise 1929 Production Level 75 Per Cent

A 75 per cent increase in the 1929 production level would be necessary to provide a "reasonable" standard of living for every family in the United States, according to the Bureau of Home Economics of the United States Department of Agriculture. The productive equipment of 1929, according to exhaustive surveys, was capable of producing only about 20 per cent more than it did. From this it would appear that there is still plenty for both men and machines to do.

A Toolmaker Delves into History

(Continued from page 3)

system was born — the system that not only revolutionized the manufacture of arms, but became the basis upon which American manufacturers built their present-day reputation of superiority in all other lines of Manufactures.

The American Toolmaker — the Most Skilled Mechanic in the World

When all the skill, capacity, and brains utilized in the accomplishment of the mechanical results outlined in the foregoing are considered, is it irrelevant to make the assertion that the genius and intelligence utilized in the inventing, developing, perfecting, and manufacture of machinery are second to none and above most? We think not; and if any one who doubts the truth of it will stroll through a modern machine shop, of the kind necessary to the production of intricate, labor-saving machinery, and notice the various operations through which the parts used in the construction of such machinery go, and *the special tools, fixtures, appliances, arrangements, devices and machinery used for their production, we think he will change his mind and will be grateful that America and Americans can boast of men who are capable of such things; for it is to such as they, more than all others, that we owe our commercial and industrial supremacy of today.* The great changes in the last century, which have contributed to the uplifting and betterment of the human race, are marked by the achievements of men whose whole lives and energies have been devoted to the perfection and production of things mechanical. This genius of invention which has conceived, developed, and made possible the manufacture of labor-saving machinery has multiplied and improved the necessaries as well as the luxuries of life.

Before closing this introductory chapter, I will say the industrial supremacy of the United States in the twentieth century has come about through the developing and perfecting of the modern system of interchangeable manufacturing, and will ever stand as a monument to the skill and ingenuity of the American mechanic."

After reading that, I felt mighty proud. I was all set to go back to the little old shop on Monday morning.

But I had one regret: That so many of our members seem determined not to take into account the value of their skill and experience when they figure a job.

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Better Machine Tools

(Continued from page 11)

lathe with its belt drive, providing a handy means of moving the faceplate into proper position or adjusting the carriage when engaged with the screw, is an example of a machine providing manual convenience. While recognizing the outstanding advantages of motor drive and geared head design, machine tool builders should take care to provide the toolmaker with equivalent means of accomplishing the same delicate adjustments by hand with a minimum of effort and inconvenience and a certainty of yield to the touch.

Simplified Feed and Speed Changes

A reasonably wide range of feeds and speeds should be provided for the requirements of the toolmaker, and the means of effecting these changes should be simplified to the utmost possible extent. In this respect mass-production design has made a definite contribution to the tool room, and the dial and lever mechanisms and other quick change means which modern production machines afford find ready acceptance in the tool room, though they are too often applied exclusively to machines which are for other reasons unsuitable for tool room use.

Interesting evidence of the recent recognition of the essentially manual character of tool room equipment is exemplified in the development of small-sized surface grinders with hand-operated tables. More often than not in the old days the Brown & Sharpe No. 2 surface grinder was stripped of its power feed and traverse mechanism as soon as it was set up in the tool room. Today, grinder manufacturers are at last offering machines minus these needless mechanisms, with resultant savings to the buyer and where power feeds are applied they are offered in high-speed machines, often hydraulically operated, for roughing out die blocks, etc., at speeds which really mean something to the toolmaker. Such machines represent a sound application of automatic principles —that is, they substitute power for manual operation where power operation will really do a better and faster job.

Long Time Precision Required

For tool room use, the machine tool must above all provide means for attaining the ultimate in precision and beyond this it must be so constructed that its inherent accuracy will not be easily destroyed in use. The latter-day development of end measuring devices for locating purposes on boring machines and jig borers is a definite forward step. Where precision lead-screws are utilized longevity would dictate their being supplemented by some automatic compensating device which can be periodically touched up to compensate for the natural wear occurring between lead-screw and nut. This is a commonplace feature of design in specially equipped precision lathes utilized by gage makers but it has yet to be offered as a standard feature of a commercial tool room lathe. Appli-

(Continued on page 15)

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Better Machine Tools

(Continued from page 14)

cation of this principle has been successfully made in the type of jig boring machine manufactured by the Société Genevoise—the familiar Swiss jig borer. Time alone will prove whether this or the end measure method is preferable for accurate locating purposes in a machine of this character.

Summarizing the peculiar requirements of the tool room with respect to its equipment, then, machine tools for this special use should be light, versatile, adaptable to a wide range of work, easily adjustable, readily set up, delicate in touch and feel, yet sufficiently rugged to withstand the rigors of constant use, and capable of producing work of the utmost precision over a long period of time.

Recent Show Replete With Tool Room Machines

Happily the machine tool builders who seemed so blind to the needs of the toolmaker in 1929 have had a change of heart and the 1935 Show was replete with tool room equipment which combined many of the high speed features of modern production equipment with the old-time ready adaptability to the manual dexterity of the toolmaker.

A good example of modern and effective milling machine design for tool room use is illustrated in Fig. 1 (Milwaukee new light-type milling machine made by the Kearney & Trecker Corp.). Several machines of this type were shown in Cleveland last fall—new models which are of materially lighter construction than the machines which in 1929 had all but superseded the old tool room miller. In the new light-type miller, rigidity and stability have been accomplished through studied ribbing and advanced design in lieu of sheer weight. The table and knee are sufficiently light so that the toolmaker can readily move them at will to settings of a fraction of a thousandth. A wide range of feeds and speeds (up to 28 in. of table feed and 40 to 1300 r.p.m. spindle speed) is readily obtainable through a quick acting dial device or other simple means.

Versatility and applicability to a wide range of uses is important in a tool room milling machine. Fig. 2 (Brown & Sharpe Omniversal milling machine), shows a machine which fills a long desired need—a milling machine which can readily be set to mill any simple or compound angle desired. The knee swivels through 60 deg. right and left while the table itself, supported on the knee, can be swivelled at right angles to this direction through an arc of 50 deg. either side of zero. Verniers are provided for accurate setting to 2 min. in each case. Combined with facilities for high speed light milling, this machine should prove a veritable boon to the toolmaker.

(Concluded in April "PROGRESS")

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